

## CHAPTER THREE

## Level of Service Standards

State law requires that level-of-service standards be established as part of the Congestion Management Program (CMP) process.<sup>17</sup> Level of service must be measured by methods described in one of the following documents: Transportation Research Board Circular 212, the latest version of the Transportation Research Board's *Highway Capacity Manual* (HCM), or a uniform methodology adopted by the CMA that is consistent with the *HCM*. The legislation leaves the choice of level-of-service measurement methodology to the CMA.

LOS definitions generally describe traffic conditions in terms of speed and travel time, volume and capacity, freedom to maneuver, traffic interruptions, comfort and convenience and safety. LOS is represented by letter designations, ranging from A to F. LOS A representing the best operating conditions and LOS F the worst. See Appendix C for graphic representation of LOS.

The purpose of setting LOS standards for the CMP system is to provide a quantitative tool to analyze the effects of land use changes and to the system's performance (i.e., congestion). If the actual system performance falls below the standard (i.e., congestion worsens to LOS F), actions must be taken to improve LOS. Each year, the CMA is required to determine how well local governments meet CMP standards, including how well they meet the LOS standards.

Each year since 1991, the CMA has contracted with a consultant to perform the necessary LOS monitoring for the CMP-network. In 1998, the Board adopted a policy that the LOS monitoring will be done every two years instead of annually. Based on this, the next monitoring study will be done in spring 2010. This has proven to be the most cost-effective approach and may continue.

Alternatively, if Caltrans assumes responsibility for monitoring the freeway system as required or if local jurisdictions assume responsibility for monitoring local roads, evaluations will be structured to allow a self-certification process using Caltrans or local reports of LOS. The CMA will determine how well areas meet LOS standards based on these reports at the time of the annual conformance findings. The CMA will ensure that the adopted standards are monitored in a consistent manner by all local jurisdictions and/or Caltrans.

Local governments will need to consider the effects their land use decisions may have on future LOS on the regional transportation system. Therefore, cities and counties may have to develop funding for

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<sup>17</sup> California Government Code Section 65089(b)(1)(A)

projects and programs that will improve LOS on the CMP-network. If local land use decisions make the LOS on the state highway system worse, cities and the county may be responsible for the necessary improvements.

To provide a basis for more definitive strategies for maintaining LOS standards in subareas of Alameda County, the CMA has completed a program of corridor studies in the following high-priority corridors:

- I-80
- San Pablo Avenue
- I-880
- I-238
- I-580/Altamont Pass
- I-680
- I-580 Corridor BART to Livermore
- I-680 Value Pricing
- North I-880 Safety and Operations Study
- San Pablo and I-880 SMART Corridor programs
- Tri-Valley Triangle Study
- Central County Freeway Study

## LOS STANDARDS

### Goals and Objectives

LOS indicates traffic growth trends using vehicular volumes, capacity, and measurement of average speed and delay. The objectives are to develop a consistent approach which is easy to use, non-duplicative and compatible with local government data and travel-demand models. The approach is outlined in Table 4.

**Table 4—Approach to LOS**

ISSUE	APPROACH
Interregional Trips	As defined by statute, “interregional travel means any trip that originates outside” Alameda County. A ‘trip’ means a one-direction vehicle movement. The origin of any trip is the starting point of that trip. In accordance with MTC guidelines, trips with no trip end in Alameda County (through trips) were not subtracted for monitoring reports.
Level of Service	The LOS standard is E, except where F was the LOS when originally measured, in which case the standard shall be F. The method of analysis is documented in “ <i>Establishing the Existing Level of Service for the Alameda County CMP-Designated Roadway System</i> ”. The methods employed constitute a uniform methodology adopted by the CMA that is consistent with the <i>1985 Highway Capacity Manual (HCM)</i> and have been approved by MTC. Methods described in Chapter 8 (Two-Lane Highways) and Chapter 11 (Urban and Suburban Arterials) of the <i>HCM</i> were the basis for establishing the level of service on the CMP system. LOS is assessed based on the average speed observed along a roadway segment (link speeds), or total volumes approaching an intersection (link volumes). These methods are not designed to replace the more detailed procedures that local agencies are likely to use for non-CMP purposes (such as local impact studies). Such procedures typically focus on an intersection’s ability to handle individual turning movements.
Monitoring	The CMA will conduct LOS monitoring, although the cities, county or Caltrans may eventually assume responsibility for monitoring segments in their respective jurisdictions. State statute <sup>18</sup> requires Caltrans to monitor LOS on the freeway system, unless the CMA designates that responsibility to another entity. Monitoring will be conducted biennially, recognizing that other surveys could be done for development impact studies (e.g., intersection turning movement counts). The method of data collection is the floating car technique of recording travel times between checkpoints based on actual travel time during the peak period. Data from several runs in all non-high-occupancy vehicle (HOV) lanes are averaged for each roadway segment.

## Facility Classifications

The HCM provides methods for determining LOS on several types of facilities. These facilities are grouped into “interrupted-flow” and “uninterrupted-flow” facilities. Interrupted-flow facilities include city streets and surface highways (like State Route 123/San Pablo Avenue) that are part of the state highway system. Freeways are uninterrupted-flow facilities. For purposes of LOS analysis, the CMP-network can be classified into three functional types of facilities: freeways; two-lane roadways; and urban/suburban arterials.

<sup>18</sup> California Government Code Section 65089(b)(1)(A), Amended 1995.

## **Freeways**

Freeways are uninterrupted-flow facilities, since traffic never stops (except during the most congested periods or when incidents occur). For the 1991 CMP, the CMA, in coordination with local jurisdictions, defined appropriate segments and performed the necessary floating car runs on the freeways to obtain travel speed data. This allowed the establishment of a baseline LOS for the system, including identification of segments operating at LOS F. It is anticipated that Caltrans may eventually monitor freeway system, as required by statute (Katz, Statutes of 1995).

## **Two-Lane Roadways**

Two-lane roadways are uninterrupted-flow facilities. The criteria for including principal arterials in the CMP-network specify a minimum of four lanes; therefore, two-lane roadways are not included as principal arterials. However, two-lane state highways are included, since all state highways must be in the system. These two-lane roads constitute a fairly small portion of the CMP-network mileage. , but a method for level-of-service analysis is suggested here. For two-lane roads without interruptions (signals or stop signs), Chapter 8 of the HCM is used, based on average travel speed.

## **Urban and Suburban Arterials**

Urban and suburban arterials are multi-lane streets that have traffic signals spaced no more than two miles apart on average. Because the CMP legislation emphasizes systems-level planning, Chapter 11 of the HCM is used to estimate arterial LOS. Advantages include the need for relatively little input data, simple applied calculations and the results of explicitly determined LOS (A, B, C, etc.).

## **LOS Methodology**

Urban and suburban arterials are characterized by platoon flows. Operational quality is controlled primarily by the efficiency of signal coordination and is affected by how individual signalized intersections operate along the arterial. LOS is primarily a function of travel speed along segments, and is calculated from field data. Beyond measuring existing LOS conditions (using actual counts or travel speed measurements), the CMA's approach is to be forward-looking. Using the Alameda countywide travel model, future LOS conditions on the CMP-network will be estimated by analyzing information about local land use decisions and taking into account local investments in transportation, which are proposed in the Capital Improvements Program of the CMP. Using the countywide model, it is possible to forecast average travel times and speeds for future traffic operations. The results would need to be checked for reasonableness under existing conditions before being used as a forecasting tool.

## **TRAFFIC MONITORING PROGRAM**

The CMA currently conducts LOS monitoring on CMP system roadways. If the cities, county or Caltrans assume responsibility, monitoring could be accomplished through a self-certification process involving the local jurisdictions and/or Caltrans and the CMA.

## Self-Certification Process

By June 15 of each year, a set of travel time runs are to be submitted to the CMA for the CMP-network. A city or the county, if it assumes responsibility, would submit the information, except for the freeways, within its jurisdictional limits. If Caltrans assumes responsibility for the freeways, it would similarly submit summary data to the CMA by June 15. Local jurisdictions or Caltrans will also be responsible for calculating LOS according to Table 5, which is based on Chapter 11 of the HCM. Local agencies or Caltrans will keep raw field data available for the CMA to examine for at least three years. Travel time runs will be completed by mid-May each year. ACTAC will provide technical guidance and assistance in reviewing methodology and interpreting LOS monitoring results.

## Data Requirements

In addition to the basic geometric, signal timing, and other such “physical” information, the traffic monitoring program requires information about average travel speed, which is the basis for level-of-service measurement on all facility types (i.e., freeways, two-lane highways (uninterrupted) and urban/suburban arterials). For a given roadway segment, monitoring must be performed and reported separately for each travel direction. Travel speed studies normally are conducted using “floating” cars that drive at the posted speed, or if constrained by traffic conditions, at the average speed of traffic. Starting 2008, the Global Positioning System (GPS) is used to record travel data in “floating car” method.

Until 2004, LOS monitoring was conducted for all the CMP segments during the p.m. peak hours (4:00 p.m. to 6:00 p.m.) and for selected freeway CMP segments during the a.m. peak hours (7:00 a.m. to 9:00 a.m.). The CMA Board recommended that all CMP roadway segments be monitored during both peak periods starting 2006 LOS monitoring period. The a.m. peak monitoring will be for informational purposes only.

## Acceptability of Data

A suggested approach to ensure acceptable monitoring is described in *Establishing the Existing Level of Service for the Alameda County CMP-designated Roadway System* (CMA, 1991). This document is based on the Institute of Transportation Engineer’s *Manual of Traffic Engineering Studies* (Chapter 7, Test Car Method). A test car is driven six times in each direction on all CMP-network. This frequency may be adjusted later for roadway segments found to consistently operate at LOS A or B. More than six test car runs are performed on roadway segments operating at LOS E or F because a greater range or fluctuation in data typically occurs. Test car runs will be repeated biennially.

The following guidelines will be used to determine acceptability of data for use in the CMP:

- Test car runs must be made on a Tuesday, Wednesday and/or Thursday, because these days are most indicative of average weekday conditions.
- Test car runs on a particular segment must span a range of days and time of day. This means that test car runs should not be bunched on the same day of the week or taken on separate days at the same time.

## LEVEL OF SERVICE STANDARDS

- Runs near holidays, when school is not in session or when roadway construction is under way, must be avoided.
- Consistent monitoring periods must be observed for each roadway segment. For example, a comparison between April 2002 and April 2003, is likely to be more valid than a comparison between January 2002 and August 2003.
- If special generators are located within a few miles of the monitoring location, it must be determined whether unusual or unwanted activity levels are occurring at the special generator. A call to a shopping center management company, for example, could be made to ascertain that the test day(s) was reasonably close to average, and that no retailers were holding major sales.

**Table 5—Relationship between Average Travel Speed and LOS**

## ARTERIALS

Arterial Class	I	II	III
Range of Free Flow Speeds (mph)	35 to 45	30 to 35	25 to 35
Typical Free Flow Speed (mph)	40	33	27
Level of Service	Average Travel Speed (mph)		
A	$\geq 35$	$\geq 30$	$\geq 25$
B	$\geq 28$	$\geq 24$	$\geq 19$
C	$\geq 22$	$\geq 18$	$\geq 13$
D	$\geq 17$	$\geq 14$	$\geq 9$
E	$\geq 13$	$\geq 10$	$\geq 7$
F	$< 13$	$< 10$	$< 7$

## FREEWAYS

LOS	Average Travel Speed (mph)	Volume-To-Capacity Ratio	Maximum Traffic Volume (vehicles / hour / lane)
A	$\geq 60$	0.35	700
B	$\geq 55$	0.58	1,000
C	$\geq 49$	0.75	1,500
D	$\geq 41$	0.90	1,800
E	$\geq 30$	1.00	2,000
F	$< 30$	Variable	-

Source: *Highway Capacity Manual*, Transportation Research Board, 1985.

Range for LOS F for Freeway Sections:<sup>19</sup>

- F30–Average Travel Speed  $< 30$  mph
- F20–Average Travel Speed  $< 20$  mph
- F10–Average Travel Speed  $< 10$  mph

<sup>19</sup> Approved by Plans and Programs Committee of the ACCMA on June 14, 2004 to show degrees of LOS F on congested roadways.

## Definition of Roadway Segments

For surface highways, ACTAC determined route segments for travel time analysis, with input from appropriate departments (traffic engineer, planning department, etc.) at the local jurisdiction. This determination used the following guidelines:

- Segments should be at least one mile and not more than five miles in length.
- Logical segment break-points include: jurisdictional boundaries; points where the basic number of travel lanes change; locations where land use changes occur (e.g., commercial area versus residential), points where the posted speed limit changes or where the number of adjacent driveways is significantly different.

Since the adoption of the CMP roadway segments in 1991, the intensity and location of congestion throughout the county has changed. Therefore, in 2007, ACTAC reviewed the CMP roadway segment lengths and the criteria for designating the CMP roadway segments to develop new segments that better reflect existing land use and travel patterns. It was found that from a field and operating perspective, the CMP roadway segmentation criteria were still appropriate and therefore it was recommended that no changes be made. However, many long segments were found to be showing better levels of service by averaging speed over the length of the segments. Splitting these segments using the approved criteria revealed congestion hot spots. To more accurately identify congested segments, the longer segments were split into shorter segments. Because this original check points were retained for this exercise, all new segments nest within the old segments. This is important so that trends can be evaluated over time. The complete list of CMP roadway segments including the new segments are shown in Appendix H. Many new segments are located on I-580 in the Tri-valley area. There are only four arterials that are further segmented. For the 2009 CMP Update, SR 84 in East County was segmented into shorter segments.

To date the CMA has performed all data collection (floating car runs) on the CMP-designated system of arterials and freeways. However, the CMA continues to work to ensure that the California Department of Transportation, Caltrans, will eventually assume responsibility for collecting all data necessary for determining levels of service on freeways. According to statute (Katz, Statutes of 1995), Caltrans “is responsible for data collection and analysis on state highways, unless the {CMA} designates that responsibility to another entity. The {CMA} may also assign data collection and analysis responsibilities to other owners and operators of facilities or services if the responsibilities are specified in its adopted program”.

## Identification of LOS F Roadway Segments

Between July and October, 1991, the CMA completed travel time studies to establish existing LOS on all segments of the CMP-network during the p.m. peak period. Travel time studies were conducted during the p.m. peak period on Tuesdays, Wednesdays, and Thursdays. Information gathered consisted of travel time runs on all CMP routes. A range of four to 10 travel time runs in each direction were done to estimate average travel speeds, in accordance with CMP requirements and Institute of Transportation Engineers recommendations, as specified in their *Manual of Traffic Engineering Studies*.



Travel time checkpoints for principal arterials were generally chosen at signalized intersections; for freeways, interchange ramp junctions were used. Further detail about segment LOS monitoring methodology and results are available by contacting the CMA.

During the 1992 monitoring cycle it was determined that freeway-to-freeway connectors had not been monitored as part of the 1991 baseline LOS determination. Monitoring of these segments was performed, together with the rest of the network, between August and September, 1992. Five freeway connector segments were operating at LOS F, and they were grandfathered as permitted by the statutes. The LOS freeway-to-freeway connections are shown in Table 6.

Tables 6 and 7 and Figure 8 identify the system segments (on freeways and principal arterials) found to operate at LOS F in 1991. According to the study results, a total of 15 freeway segments (excluding freeway to freeway connectors) and 15 arterial segments were operating at LOS F during the p.m. peak period in 1991. These segments, which operated at LOS F during 1991 (the first year of the CMP), are grandfathered from CMP requirements for preparing a deficiency plan.

### **Grandfathered Segments**

The 30 segments (15 freeway and 15 arterial) grandfathered by statute in 1991 are not exempt from analysis and mitigation for purpose of satisfying the Land Use Analysis Program (Chapter 6), the California Environmental Quality Act (CEQA) and the federal National Environmental Protection Act (NEPA). The CMP focuses on existing congestion, therefore strategies and/or improvements to address grandfathered segments should be considered in corridor studies, investments in the *Countywide Transportation Plan* and the CMP Capital Improvement Program (CIP).

### **Infill Opportunity Zones**

SB 1636 (Figueroa) signed by the Governor in 2002 established “infill opportunity zones” to encourage transit supportive development. The statute exempts infill opportunity zones from the requirements to maintain the LOS E. The city and/or county shall either include the streets and highways under an alternative areawide LOS or a multi-modal composite or personal LOS standard or approve a list of flexible LOS mitigation options.

Specific land uses are required in the Infill Opportunity Zone (see government code section 65088.1(g)). Infill opportunity zones must be designated by a city or the county and contain the following characteristics: zoned for new compact residential or mixed use development within 1/3 mile of an existing or future rail transit station, ferry terminal served by either a bus or rail transit service, an intersection of at least 2-major bus routes or within 300 feet of a bus rapid transit corridor in counties with population over 400,000.

The process to adopt the guidelines and strategies for implementing infill opportunity zones in Alameda County including clarifying agency roles and policy objectives were reviewed in 2007. As a result, it was determined that if a jurisdiction wishes to adopt an infill opportunity zone, they are requested to notify the

CMA first and work towards a mutually agreeable set of mitigation measures or alternative LOS standards.

### **Frequency of Monitoring**

Since a fair number of roadway segments operate at LOS A, it would be a poor use of limited resources to recalculate these LOS every year. It is unlikely that a system segment will fall from LOS A to below E in just one year. To reduce calculation effort, traffic monitoring to comply with the CMP may be done only for segments operating at LOS C or worse, at the option of the local jurisdiction. The focus should be on analyzing problem areas. Analysis of transportation impacts of proposed local land use decisions will highlight segments, which may need to be monitored more closely. Thus, if a link is expected to be approaching LOS E or F, it will be monitored and its LOS analyzed more frequently than segments at better service levels.

### **COMPARISON WITH PREVIOUS RESULTS**

The results of several years of LOS monitoring, as presented in Table 8, show that overall traffic conditions for long-distance trips on the CMP freeway network have generally remained stable or improved. Though not particularly strong, an overall trend or change can be interpreted from comparisons with the 1991 LOS data. There is some improvement in average traffic conditions (i.e., higher speeds) on these longer distance freeway trips over 1991 conditions. However, there are still congested points found along most of the routes. System capacity and operational enhancements account for improvements on some facilities.

### **COMPLIANCE AND CONFORMANCE**

Government Code Section 65089.3(a) requires the CMA to biennially monitor conformance with the adopted CMP. Among the requirements, the CMA must find consistency with the LOS standards. If a roadway segment is not conforming to the LOS standards based on the biennial monitoring, the affected local jurisdiction will be notified, and may elect to remedy the LOS problem or prepare a deficiency plan (see Chapter 8). If after 90 days the local jurisdiction is still in non-conformance, the CMA is required to provide notice to the CTC and the State Controller. The notice includes the reasons for the finding and evidence that the CMA correctly followed procedures for making the determination.

The State Controller would then withhold the non-conforming jurisdiction's increment of subventions from the fuel tax made available by Proposition 111, and the jurisdiction will not be eligible to receive funding for projects through the federal STP and CMAQ Program. If within the 12-month period following the receipt of a notice of non-conformance, the CMA determines that the city or county is in conformance, the withheld Proposition 111 funds will be released to the CMA for projects of regional significance included in the CMP or a deficiency plan.

## LOCAL GOVERNMENT RESPONSIBILITIES

At present, the CMA is contracting with a consultant to monitor all segments of the CMP roadway system. If a local government or Caltrans assumes responsibility for monitoring roadways included in the portion of the CMP system under its jurisdiction, it must biennially monitor the LOS on the designated system and report to the CMA by June 15 of that year relative to conformance with the adopted standards.

**Table 6—LOS F Freeways for Alameda County CMP-Designated Roadway System**

These segments, which operated at LOS F in 1991, the first year of the CMP, are grandfathered from CMP requirements for preparing a deficiency plan. However, being grandfathered does not exempt these roadways from analysis and mitigation for purposes of satisfying the CEQA or NEPA or as part of the Land Use Analysis Program.

	Roadway	Dir.	Limits	Jurisdiction	Average Speed (mph)
1	I-80	WB	From: University To: I-80/580 Split	Berkeley/Emeryville	16.6
2	I-80	WB	From: I-80/580 Split To: Bay Brg Toll Plaza	Oakland	29.7
3	I-80	EB	From: I-580/80 Split To: University	Emeryville/Berkeley	25.8
4	I-80	EB	From: University To: Central	Berkeley/Albany	25.8
5	SR-24	EB	From: I-580 To: Fish Ranch Road	Oakland	28.5
6	I-580	SB	From: I-80/580 To: I-980/Hwy 24	Oakland	25.6
7	I-980	EB	From: I-880 To: SR-24/I-580	Oakland	28.5
8	I-238	EB	From: I-880 To: I-580	County/San Leandro	29.8
9	I-880	SB	From: Hegenberger To: Washington	San Leandro/Oakland	29.2
10	I-880	SB	From: Washington To: A Street	County/Hayward	24.3
11	I-880	NB	From: Tennyson To: SR-92 (Jackson)	Hayward	18.2
12	I-880	NB	From: SR-92 To: Lewelling	Hayward	23.2

# LEVEL OF SERVICE STANDARDS

	<b>Roadway</b>	<b>Dir.</b>	<b>Limits</b>	<b>Jurisdiction</b>	<b>Average Speed (mph)</b>
13	I-880	NB	From: Dixon Landing To: SR-262/Mission	Fremont	29.3
14	SR-92	WB	From: Clawiter To: Toll Gate	Hayward/County	27.1
15	SR-92	EB	From: Toll Gate To: I-880	Hayward/County	27.5

*Note:* Data is based on surveys taken during the afternoon peak period in September/October, 1992.

## FREEWAY-TO -FREEWAY CONNECTORS

<b>Ramp Connection</b>	<b>Jurisdiction</b>	<b>Length (miles)</b>	<b>Average Speed</b>	<b>Free Flow Speed</b>
I-80 SB to I-580 EB*	Oakland	0.30	18.7	45.0
I-580 WB to I-80 NB*	Oakland	0.21	16.0	45.0
I-680 SB to I-580 EB	Pleasanton	0.67	16.3	35.0
SR-13 NB to SR-24 EB	Oakland	0.35	14.4	45.0
I-580 WB; SR-24 WB to I-80 NB	Oakland	0.69	22.1	45.0

*Note:* Data is based on surveys taken during the afternoon peak period in September/October, 1992.

\* LOS condition was first reported during the 1991 surveys.

**Table 7—LOS F Arterial Segments**  
**Alameda County CMP-Designated Roadway System**

	ROADWAY	DIR	LIMITS	JURIS.	ARTERIAL CLASS	AVG SPEED (mph)
1	SR-13 (Ashby Ave.)	WB	From: Telegraph To: Shattuck	Berkeley	III	8.7
2	SR-13 (Ashby Ave.)	WB	From: Shattuck To: MLK, Jr. Way	Berkeley	III	9.3
3	SR-13 (Ashby Ave.)	EB	From: College To: Domingo	Berkeley	III	6.8
4	SR-123 (San Pablo Ave.)	SB	From: Park Avenue To: 35th Street	Emeryville/ Oakland	II	9.4
5	SR-260	SB	From: 7th/Webster To: Atlantic	Oakland/ Alameda	I	12.3
6	SR-238 (Mission Blvd.)	NB	From: Sycamore To: Jackson	Hayward	II	8.8
7	SR-92 (Jackson St.)	EB	From: I-880 To: Winton	Hayward	II	8.6
8	SR-92 (Jackson St.)	EB	From: Winton Ave. To: Mission	Hayward	II	4.5
9	Hesperian Blvd.	NB	From: La Playa To: Winton	Hayward	I	11.1
10	Hesperian Blvd.	SB	From: 14th St. To: Fairmont	San Leandro	II	9.9
11	Hesperian Blvd.	SB	From: Spring lake To: Lewelling	Unincorp.	II	9.6
12	SR-112 (Davis St.)	WB	From: I-880 To: San Leandro Blvd.	San Leandro	II	5.2
13	Decoto Road	WB	From: Union Square To: Alvarado-Niles	Union City	II	8.6
14	SR-84 (Fremont Blvd.)	WB	From: Peralta Blvd To: Thornton Ave.	Fremont	II	7.2
15	Mowry Avenue	EB	From: I-880 To: Farwell Dr.	Fremont	II	9.6

*Note:* Based on surveys during the afternoon peak period (4 to 6 p.m.) in July-August and October, 1991.

**Table 8—LOS Trends on the CMP-network (afternoon peak period)**

ROAD	DIR	LIMITS	DIST (mi.)	MILES PER HOUR										
				'91 Aug	'91 Oct	'92	'94	'96	'98	'00	'02	'04	'06	'08
I-80	EB	Bay Bridge Toll Plaza to Contra Costa line	6		23	20	22	21	20	27	19	32	23	21
I-80	WB	Contra Costa line to Bay Bridge Toll Plaza	6	26	25	24	23	25	28	18	22	28	28	36
I-580	EB	I-238 to I-205	31	-	56	55	55	55	na	41	31	34	36	35
I-580	WB	I-205 to I-238	31	-	57	56	57	61	na	55	55	60	58	61
I-580	EB	I-80 to I-238	16	-	53	52	44	53	60	63	55	43	34	47
I-580	WB	I-238 to I-80	16	-	58	55	51	52	61	63	60	57	55	63
I-680	NB	Scott Creek Rd. to Alcosta Blvd.	21	-	58	57	57	52	51	58	51	42	53	43
I-680	SB	Alcosta Blvd. to Scott Creek Rd.	21	-	59	58	55	61	67	63	62	66	58	63
I-880	NB	Dixon Landing Rd. to I-980	30	42	45	44	43	46	38	48	38	49	45	43
I-880	SB	I-980 to Dixon Landing Rd.	30	47	43	40	38	46	50	49	41	37	37	48
SR-13	NB	Mountain Blvd to Hiller Dr.	6	51	54	50	49	48	53	51	50	35	39	51
SR-13	SB	Hiller Dr. to Mountain Blvd	6	57	56	59	53	47	59	59	55	54	57	49
SR-24	EB	I-580 to Fish Ranch Rd.	5	29	30	29	30	24	39	33	21	40	25	24
SR-24	WB	Fish Ranch Rd. to I-580	5	53	54	58	54	50	60	57	61	59	59	58



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